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TITLE "EVALUATION OF THE BASS RIVER NOVA SCOTIA MAGNETITE DEPOSIT (bulk sampling program)"

CONTRACTOR: LODESTONE LTD.

BULK SAMPLING PROGRAM

FOR

THE BASS RIVER MAGNETITE PROJECT

Submitted To : Energy , Mines And Resources

By : Lodestone Limited

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I

INTRODUCTION

As per the terms of reference of the feasibility study on developing the Bass River magnetite deposit Lodestone Ltd. has undertaken a bulk sampling program of the deposit. This program was designed to assess the technical feasibility of producing magnetite for heavy media and to improve the database base on mining, processing and usage parameters. The program included three elements:

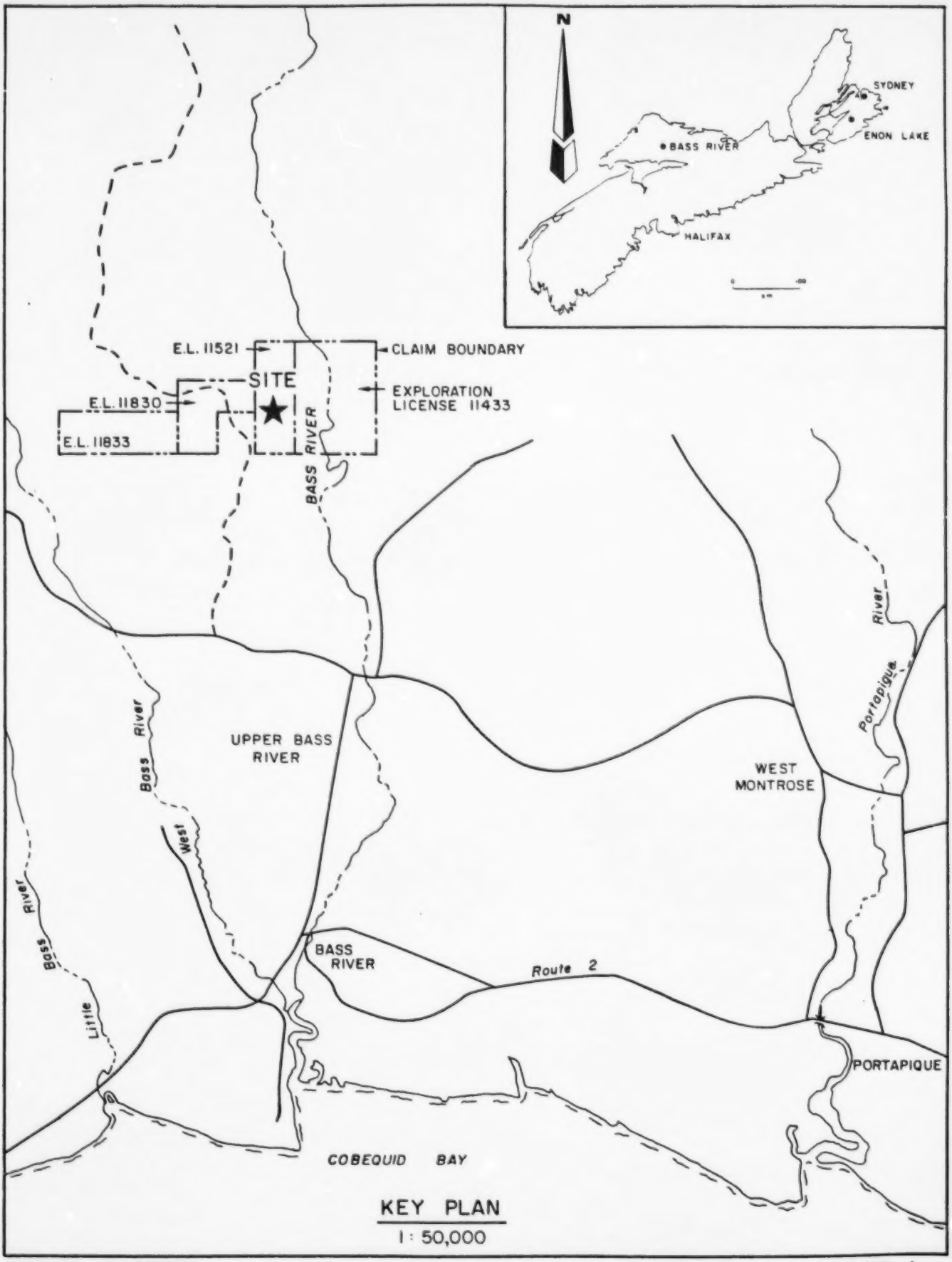
(1) Bulk sample quarrying of 2,000 tonnes of ore;

(2) Production of 1,000 tonnes of magnetite suitable for heavy mdeia applications;

(3) Testing of the magnetite as heavy media in a coal preparation plant.

The program was conducted by Lodestone Ltd. using the supervisor services of A.B. Barrett and Shebib and Associates. Quarrying was undertaken using excavation contractors. Production tests were conducted using an idle froth flotation plant modified for magnetic separation. Testing of the magnetite was undertaken by the Cape Breton Development Corporation at the Victoria Junction Coal Preparation Plant. The three sites are shown in figure 1. The program, despite problems, was

essentially very successful. The following chapters describe the various elements of the program in terms of methology and results.



KEY PLAN

1 : 50,000

JACQUES, WHITFORD

FIGURE 1

II

BULK SAMPLING PROGRAM

A. AN INTRODUCTION

The bulk sampling program was designed to provide a large enough sample to yield 1,000 tonnes of magnetite product and provide geology and geotechnical information on the ore body. The following sections describe the site, extraction method, and geology .

B. THE SITE

The ore was extracted from the eastern portion of the Bass River deposit. Map sheet no. M1313-1 of the Jacques Whitford report shows a plan of the deposit and test pit site.

The ore was extracted from this site because the data base (magnetite signatures, trenches and drill hole) was most complete for this area. Also, terrain considerations necessitated selection of this site.

C. PIT DESIGN

The ore was extracted from a small open cut across the width of the mineralized zone. The pit plan is shown in Map of the accompanying Jacques Whitford Report.

We originally planned to extract about 4,000 tonnes to yield 1,000 tonnes of product. Overburden thickness as shown in the attached sections proved to be somewhat deeper than expected. Ore grades proved to be somewhat higher than projected (due largely to grade calculation methods). Hence, only 2,000 tonnes of ore was needed to achieve the targeted production of 1,000 tonnes.

D. SITE PREPARATION

Roughly 2,000 tonnes of ore was extracted through the following procedures:

(1) Road Construction

(2) Construction Of Settling Pond

(3) Over-burden Removal

Access to the deposit was attained by construction of 1,5 kilometres of Class B gravel road. The road followed the topographic contours as shown in the attached Map # 2 - Jacques Whitford Report.

Site preparation included tree removal, root grubbing, and settling pond construction. (Refer to Map 4 for the final site plan).

E. PIT GEOLOGY

The geology in the open cut is more or less consistant with that predicted by results from mapping, trenching, drilling and magnetometer surveys. The open cut exposed a cross-section of the mineralized zone though the foot wall was not reached.

The deposit, as shown in the cut, consists of a somewhat irregular pod of magnetite and iron sulphides as replacement and fracture fill in a silaceous matrix.

F. EXTRACTION

The extraction program consisted of four elements:

(1) Loose, broken ore overlying bedrock was removed to solid bedrock using a D-7 bull-dozer ;

(2) A series of bore holes were drilled on 2 metre centers and blasted using dynamite ;

(3) The broken ore was then loaded into haulage trucks from site using a 944 front-end loader ;

(4) The site was mapped and then reclaimed by spreading the topsoil and hydroseeding .

III

BENEFICIATION TESTS

A. INTRODUCTION

Lodestone Ltd. is assessing the development potential of it's magnetite deposit located near Bass River, Nova Scotia. As part of the development process, pilot plant tests were necessary to determine if magnetite suitable for heavy media can be economically produced and to generate 1,000 tonnes of finished product for testing by potential customers. Lodestone arranged to use the processing plant formerly owned by Novex Mining and Exploration Co. Ltd. to conduct the pilot plant tests.

B. THE SITE

The Novex Mill is located at Enon, Cape Breton County, NS., as shown in Figure 1. The site, as shown in Figure 2, includes:

- a froth flotation plant capable of processing 500 - 700 tonnes per day.
- auxilliary structures including water supply systems, a sewage treatment plant and laboratory building.
- Tailings disposal systems.

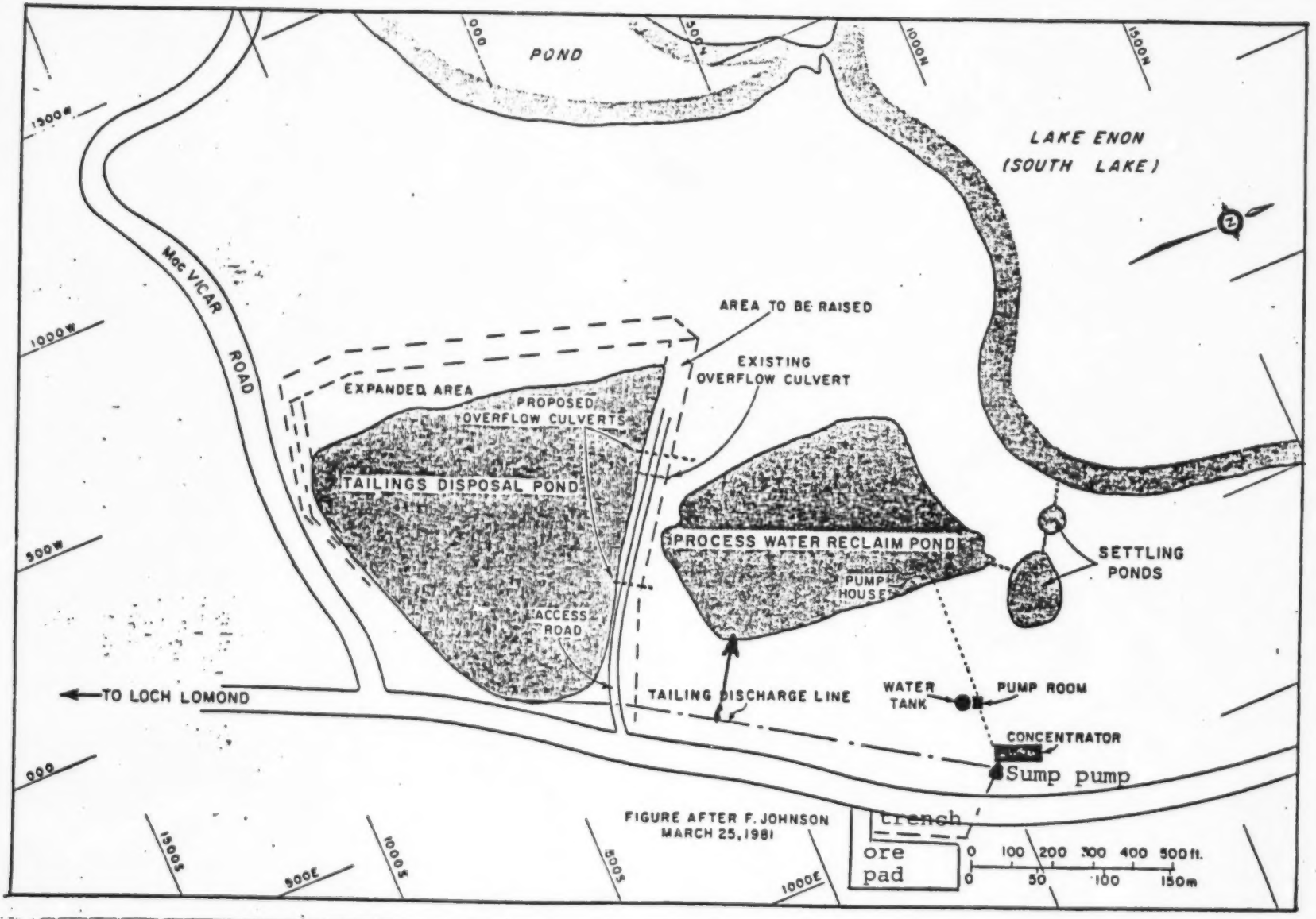
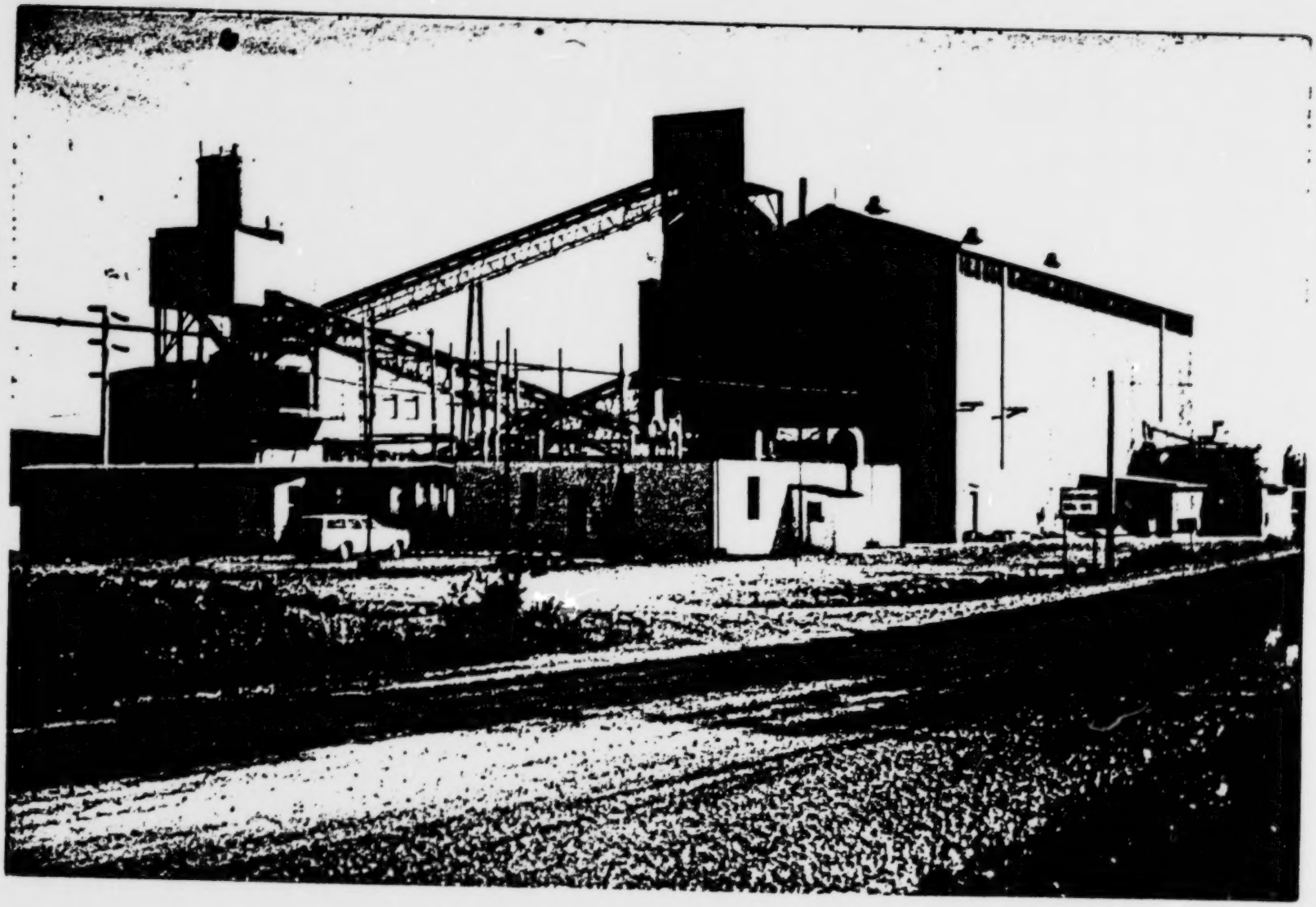


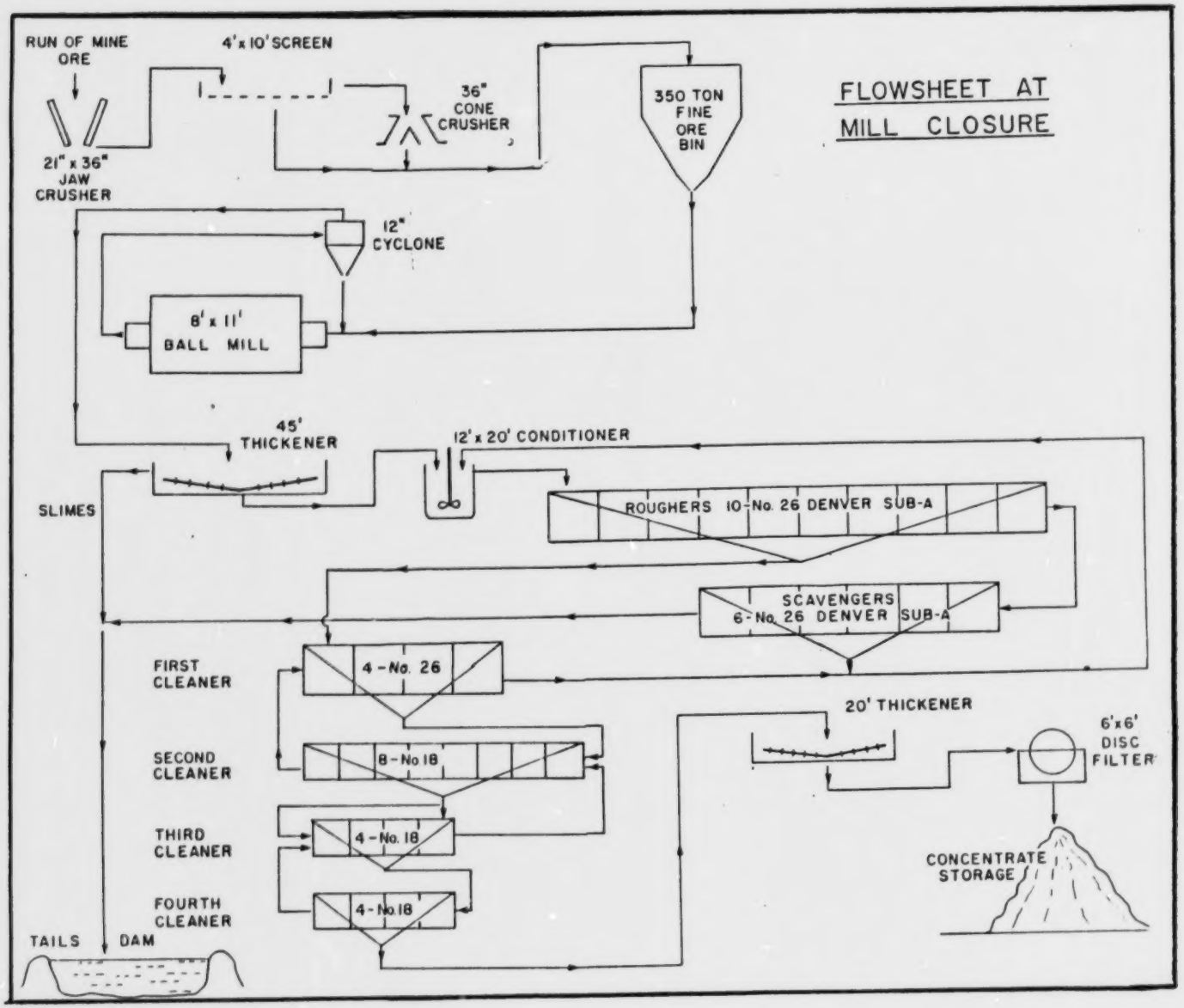
Figure 2. Mill site plan to show location of plant and tailing ponds

C. THE PLANT

Figure 3 shows a photograph of the plant.

The approximate plant flowsheet is shown in Figure 4. The Flotation circuits were by-passed as heavy media production can be achieved with simple wet magnetic separation.




FLOWSHEET AT MILL CLOSURE
RUN OF MINE ORE
4' x 10' SCREEN
36" CONE CRUSHER
350 TON FINE ORE BIN
21" x 36" JAW CRUSHER
12" CYCLONE
8' x 11' BALL MILL
45' THICKENER
12' x 20' CONDITIONER
SLIMES
ROUGHERS 10-No. 26 DENVER SUB-A
SCAVENGERS 6-No. 26 DENVER SUB-A
FIRST CLEANER
4 - No. 26
SECOND CLEANER
8 - No 18
THIRD CLEANER
4 - No. 18
FOURTH CLEANER
4 - No 18
20' THICKENER
6'x6' DISC FILTER
CONCENTRATE STORAGE
TAILS DAM

D. THE ORE

The ore consists of cryptocrystalline magnetite as fracture-fill and cement in a siliceous fault breccia. Accessory minerals include calcite (approx. 15-20%), hematite (7-10%), pyrite (4-6%), alumina () 1%). Magnetite content varies from 8-85% across the ore zone and average 35%. Minor and trace elements include manganese cobalt, vanadium titanium, zircon, nickel, chromium copper, barium, strontium, and yttrium.

The characteristics of the ore determine what processing techniques should be applied. In this case, the mineral of value, magnetite, is relatively fine-grained and disseminated, albeit unevenly, throughout the siliceous host rock. The laboratory research conducted by The Minerals Engineering Centre indicated that there are stages of liberation as defined below:

(1) Between 15 and 40% of the ore zone contains very low grade ore (less than 10% magnetite) in relatively coarse fractions. Liberation can be achieved by crushing to -2.5 cm. The ore can be upgraded to about 65% Magnetite with minimal, that is less than 2%, loss of product. Dry cobbing is indicated.

(2) About 80% of all waste is liberated at +75 microns. This indicates that initial wet separation should be done after rod mill grinding. Product losses should be less than 1% at this stage.

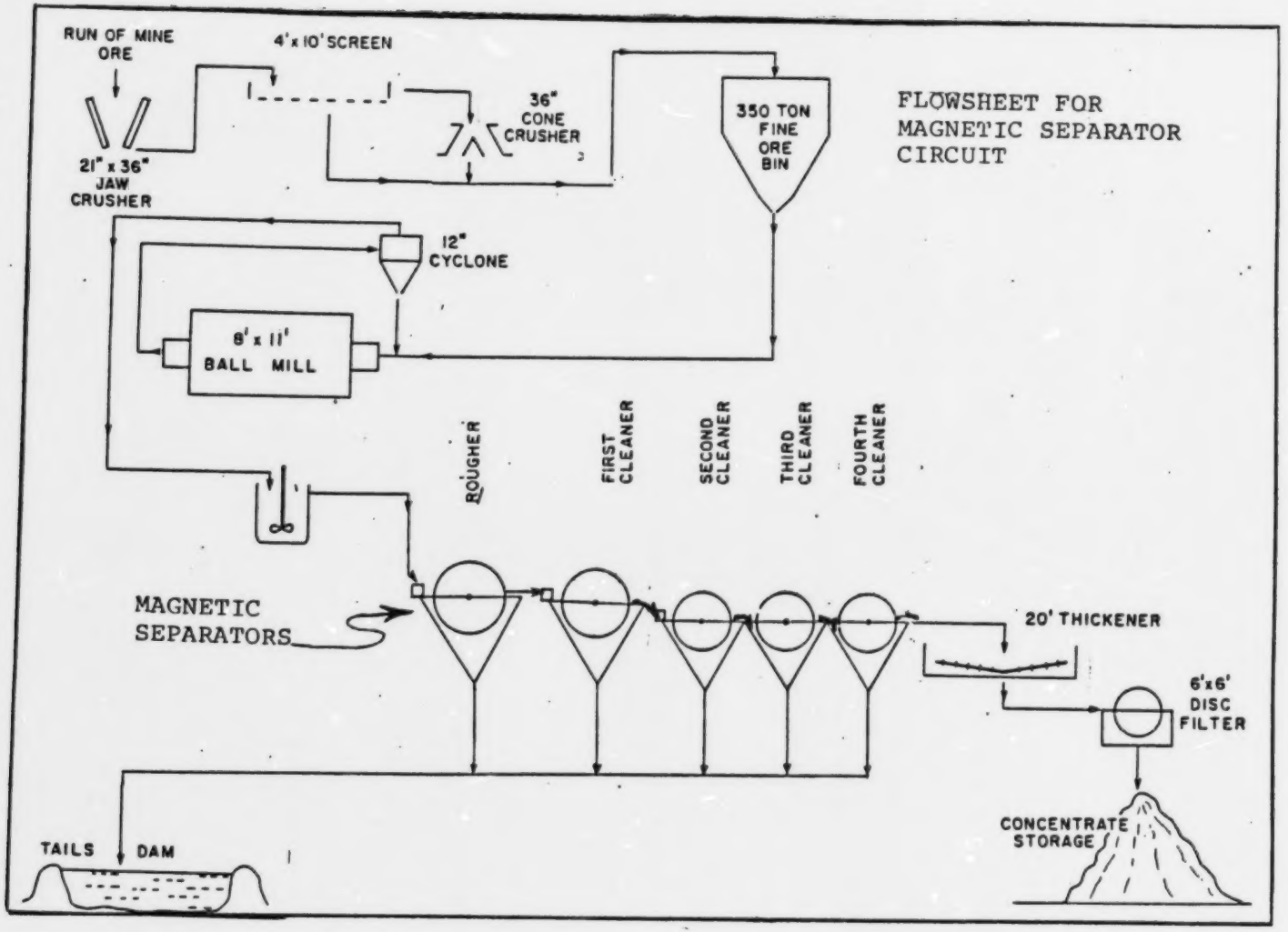
(3) Heavy media grades (92% magnetite) can only be achieved at relatively fine grinds of 85% less than 40 microns.

(4) Speciality grades of +98% magnetite require ultra-fine grinding to minus 10 microns.

The pilot plant tests described in the following section attempted to achieve proper liberation and separation as defined above.

E. THE PROCESS

The plant does not contain the optimal equipment mix as regrinding capabilities are highly desirable. However, the ball mill has adequate capacity to reduce the need for regrinding. Several circuit arrangements were tested to compensate for the lack of regrinding capabilities. The final circuit flowsheet is shown in Figure 5.



FLOWSHEET FOR MAGNETIC SEPARATOR CIRCUIT

The process can be summarized as consisting of the following elements:

- crushing magnetite ore to minus 2 cm using jaw and hammermill-type crushers.
- Storage in the fine ore bin to provide surge capacity and regulate feed to the process circuits.
- Feeding by regulated belt to the grinding circuits.
- Wet grinding in the ball mill in a slurry to reduce the ore to top size of 44 microns in a closed circuit using hydrocyclone for classification.
- Cyclone overflow goes to a conditioner to regulate flow rate.
-Conditioner overflow goes to a four-stage magnetic separator where product and waste minerals are separated.
- Magnetite product is then dewateered using the thickener and disc filter and stored in the concentrate shed.
-Waste minerals flow into tailings pump box and are then pumped into the tailings pond.
-Water is recycled from the pond.

F. TEST RUNS

The production tests were initially hampered by equipment limitations. The mill, which was the only facility available locally for testing on this scale, has only a single oversize ball mill. Hence, regrinding was not possible. This limitation was to be overcome by cobbing the cyclone underflow. The cyclone

underflow was further classified by screening at 150 microns. The screen underflow was passed through a wet drum type separator. The cobbing was effective in reducing the circulating load in the ball mill circuit and in increasing feedstock grade to the magnetite separators. However, the magnetite separator used as a cobber quickly filled with coarse pyrite, a problem which could not be overcome. Cobbing in the ball mill circuit was, therefore, abandoned.

The circuits were then set up as described in the preceding section and flowsheet (Figure 5). After extensive and prolonged de-bugging, this system was stabilized and fine-tuning commenced.

It quickly became apparent that virtually 100% recovery could easily be attained. The target grades , magnetite having a specific gravity of 4.8 with not less than 90% magnetites, could not be achieved even with overgrinding.

Effort was then focused on achieving grade. The problems identified included - (1) poor classification in the grinding circuit, (2) overloaded magnetite separators leading to entrapment of liberated particles and, (3) a high proportion of very low grade ore which was difficult to liberate. The following steps were taken to minimize the impact of those problems:

(1) A crude dry cobber was installed between the primary and

secondary crusher to upgrade the mill feed.

(2) Selective flocculation was initialized in the thickeners to reject non-magnetite lines.

(3) Varying operating parameters such as ball mill feed rates, ball mill density, grind size, etc.

Coarse cobbing, though crude, was very effective in that head grade increased from 40% magnetite to 70%. Final product grades improved from S.G. 45 to S.G. 4.7 . Selective flocculation, which was also a makeshift system, was similarily effective with the filter cake typically being 5% higher grade than the final cleaner concentrate. The results from various operating parameters are described in the following tables.

TABLE 107

TYPICAL OPERATING PARAMETERS

OCT-4-88	BALL MILL	CYCLONE O FLOW	COND.	BALL MILL FEED	
Start 1:00 p.m.	65%	22%	24%	13 T.P.H.	tuns 4 6 5
2:00	65%	23%	24%	13 T.P.H.	
3:00	65%	22%	24%	13.66 T.P.H.	
4:00	65%	23%	25%	12.77 T.P.H.	4.6 8.9.5.
5:00	Shut Down Mill at 4:45 P.M.				
OCT-5-88					
Start 8:00 a.m.					
9:00	66%	25%	23%	13. T.P.H.	
10:00	64%	27%	27%	12.76 T.P.H.	t.u.n.s.
11:00	65%	27%	28%	12.76 T.P.H.	4.65 sg
12:00	63%	26%	27%	12.32 T.P.H.	
1:00 p.m.	63%	26%	25%	12.32 T.P.H.	
2:00	66%	27%	26%	12.32 T.P.H.	
3:00	64%	27%	26%	12.32 T.P.H.	
4:00	64%	26%	26%	12.32 T.P.H.	
5:00	Shut Down at 4:45 P.M.				
OCT-6-88					
Start 8:00 a.m.					
9:00	63%	27%	26%	12.32 T.P.H.	
10:00	64%	26%	25%	12.32 T.P.H.	
11:00	63%	25%	26%	12.32 T.P.H.	
12:00	64%	26%	27%	13. T.P.H.	
1:00 p.m.	64%	26%	26%	12.32 T.P.H.	
2:00	62%	26%	25%	12.32 T.P.H.	
3:00	62%	26%	25%	11.88 T.P.H.	
4:00	64%	25%	25%	11.88 T.P.H.	
5:00	Shut Down at 4:45 P.M.				

TABLE 109

TYPICAL OPERATING PARAMETERS

OCT-7-88	BALL MILL	CYCLONE O FLOW	COND.	BALL MILL FEED
Start 8:00 a.m.				
9:00	68%	23%	22%	12.32 T.P.H.
10:00	68%	23%	22%	12.32 T.P.H.
11:00	67%	22%	23%	12.76 T.P.H.
12:00	65%	22%	22%	12.32 T.P.H.
1:00 p.m.	67%	22%	23%	12.76 T.P.H.
2:00	69%	24%	24%	12.76 T.P.H.
3:00	68%	24%	23%	12.76 T.P.H.
4:00	68%	23%	23%	12.76 T.P.H.
5:00	Shut Down Mill at 4:45 P.M.			

OCT-11-88				
Start 8:00 a.m.				
9:00	64%	24%	23%	12.32 T.P.H.
10:00	66%	24%	24%	12.32 T.P.H.
11:00	63%	23%	22%	12.32 T.P.H.
12:00	66%	22%	22%	12.32 T.P.H.
1:00 p.m.	65%	23%	23%	12.32 T.P.H.
2:00	63%	23%	22%	12.32 T.P.H.
3:00	63%	22%	22%	12.32 T.P.H.
4:00	Shut Down Mill at 3:00 P.M.			

Total burning time 38 hours.
Bin a bit better than 3/4 full.
Ball Mill Feed sg 3.73 to 3.86
Filter Cake sg. 4.65 to 4.7

1st ore bin run 46 hours
2nd ore bin run 42 hours
3rd ore bin run 43 hours
4th ore bin run 40 hours

Densitys were much the same . 200 had a large flow of water to thickner for cleaning a destimind which worked very well.

MINERALS ENGINEERING CENTRE

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Telex (TUNS) 019-21566

August 24, 1988

Lodestone
P.O. Box 937
Dartmouth, N.S.
B2Y 3Z6

Re: Results of analysis on submitted samples

	Sample	Specific Gravity	% -325
Aug.12/88	Final Conc (Triple Drum)	4.60	67.8
	S-Drum, Cleaner Conc	4.33	61.8
	Rougher Conc	4.15	67.4
	Rougher Tails	2.87	
	Triple Drum, Cleaner Tails	2.95	
	S-Drum, Cleaner Tails	2.89	
	Rock Sample	3.57	
Aug.16/88	Final Conc (Triple Drum)	4.57	70.0
	Single Drum, Cleaner Conc	4.32	
	Rougher Conc	4.15	
Aug.17/88	Final Conc	4.50	70.0
	Rougher Conc	4.19	
	Cleaner Conc	4.32	
	Filter Cake	4.49	
	Cyclone O'Flow	3.45	
	Final Tails	2.89	
	Cleaner Tails	2.71	
	Rougher Tails	2.89	
Aug.18/88	Final Conc	4.45	66.0
	Rougher Conc	4.24	
	Cleaner Conc	4.42	
	Filter Cake	4.54	
	Belt Feed	3.36	
	Cyclone O'Flow	3.30	
	Rougher Tails	2.85	
	Final Tails	2.92	
	Cleaner Tails	2.90	
Aug.19/88	Final Conc	4.51	
	Triple Drum Conc	4.48	80.0
	Single Drum Conc	4.41	
	Filter Cake	4.52	
	Ball Mill Feed	3.40	
	Cyclone O'Flow	3.51	
	Final Tails	2.92	
Devco		4.77	

C. Cole
Minerals Engineering Centre

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September 6, 1988

Lodestone
P.O. Box 937
Dartmouth, N.S.
B2Y 3Z6

Sample		% Fe	SiO_2	CaO	MgO	S
Aug. 12/88	Filter Cake	60.28	14.98	0.59	0.39	0.46
	Rock Sample	37.21	33.72	3.70	1.68	2.17
Aug. 30/88	Ball Mill Feed	34.89	32.73			
	Cyclone O'Flow	32.82	33.80			
	Final Tails	10.98	50.36			
	Filter Cake	60.41	14.64			
	Final Conc.	61.41	14.36			

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Minerals Engineering Centre

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Telex: (TUNS) 019-21566

September 7, 1988

Lodestone
P.O. Box 937
Dartmouth, N.S.
B2Y 3Z6

Re: Results of analyses on submitted samples

Sample		Specific Gravity
Aug. 24/88	Final Conc.	4.50
	Filter Cake	4.61
	Cyclone O'Flow	3.43
	Ball Mill Feed	3.48
	Final Tails	2.93
Aug. 25/88	Final Conc.	4.46
	Filter Cake	4.39
	Cyclone O'Flow	3.32
	Final Tails	2.86
	Ball Mill Feed	3.76
Aug. 29/88	Final Conc.	4.36
	Filter Cake	4.27
	Cyclone O'Flow	3.37
	Final Tails	2.83
	Ball Mill Feed	3.37
Aug. 30/88	Final Conc.	4.43
	Filter Cake	4.41
	Cyclone O'Flow	3.41
	Final Tails	2.92
	Ball Mill Feed	3.48
Aug. 31/88	Final Conc.	4.45
	Filter Cake	4.46
	Cyclone O'Flow	3.44
	Final Tails	2.89
	Ball Mill Feed	3.57
Sept. 1/88	Final Conc.	4.45
	Filter Cake	4.42
	Cyclone O'Flow	3.51
	Final Tails	2.91
	Ball Mill Feed	3.64

C. Cole
Minerals Engineering Centre

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September 16, 1988

Lodestone
P.O. Box 937
Dartmouth, N.S.
B2Y 3Z6

Re: Results of analyses on submitted samples

SAMPLE		Specific Gravity
Sept. 2/88	Final Conc.	4.48
	Filter Cake	4.47
	Cyclone O'Flow	3.53
	Ball Mill Feed	3.49
	Final Tails	2.90
Sept. 6/88	Final Conc.	4.31
	Filter Cake	4.26
	Cyclone O'Flow	3.41
	Ball Mill Feed	3.43
	Final Tails	2.95
Sept. 7/88	Final Conc.	4.30
	Filter Cake	4.22
	Cyclone O'Flow	3.44
	Ball Mill Feed	3.40
	Final Tails	2.82
Sept. 9/88	Final Conc.	4.48
	Filter Cake	4.50
	Cyclone O'Flow	3.34
	Ball Mill Feed	3.50
	Final Tails	3.07
Sept. 12/88	Final Conc.	4.38
	Filter Cake	4.56
	Cyclone O'Flow	3.47
	Ball Mill Feed	3.44
	Final Tails	2.91
Sept. 13/88	Final Conc.	4.38
	Filter Cake	4.51
	Cyclone O'Flow	3.47
	Ball Mill Feed	3.56
	Final Tails	2.89
Sept. 14/88	Final Conc.	4.47
	Filter Cake	4.48
	Cyclone O'Flow	3.49
	Ball Mill Feed	3.62
	Final Tails	2.94

Cyril Cole

C. Cole
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October 13, 1988

Lodestone
P.O. Box 937
Dartmouth, N.S.
B2Y 3Z6

Re: Results of analysis on submitted samples

Sample		Specific Gravity	Sample		Specific Gravity
Sept.15/88	Filter Cake	4.48	Sept.26/88	Filter Cake	4.56
	Final Conc.	4.53		Final Conc.	4.60
	Cyclone O'Flow	3.47		Cyclone O'Flow	3.61
	Ball Mill Feed	3.50		Ball Mill Feed	3.58
	Final Tails	3.06		Final Tails	3.06
Sept.16/88	Filter Cake	4.50	Sept.27/88	Filter Cake	4.60
	Final Conc.	4.55		Final Conc.	4.59
	Cyclone O'Flow	3.49		Cyclone O'Flow	3.56
	Ball Mill Feed	3.47		Ball Mill Feed	3.65
	Final Tails	3.03		Final Tails	3.07
Sept.20/88	Filter Cake	4.50	Sept.28/88	Filter Cake	4.56
	Final Conc.	4.49		Final Conc.	4.53
	Cyclone O'Flow	3.57		Cyclone O'Flow	3.59
	Ball Mill Feed	3.56		Ball Mill Feed	3.57
	Final Tails	3.03		Final Tails	3.08
Sept.22/88	Filter Cake	4.55	Sept.30/88	Belt Mags.	3.73
	Final Conc.	4.51		Belt Non Mags.	3.05
	Cyclone O'Flow	3.52			
	Ball Mill Feed	3.61			
	Final Tails	3.02			
Sept.23/88	Filter Cake	4.61	Oct.4/88	Filter Cake	4.65
	Final Conc.	4.54		Final Conc.	4.64
	Cyclone O'Flow	3.49		Cyclone O'Flow	3.80
	Ball Mill Feed	3.51		Ball Mill Feed	3.88
	Final Tails	3.05		Final Tails	3.08

Oct. 5/88	Filter Cake	4.65
	Final Conc.	4.63
	Cyclone O'Flow	3.83
	Ball Mill Feed	3.86
	Final Tails	3.19
Oct. 6/88	Filter Cake	4.54
	Final Conc.	4.61
	Cyclone O'Flow	3.74
	Ball Mill Feed	3.97
	Final Tails	3.14
Oct. 7/88	Filter Cake	4.50
	Final Conc.	4.58
	Cyclone O'Flow	3.75
	Ball Mill Feed	3.84
	Final Tails	2.97

C. Cole
Minerals Engineering Centre

CC/jm

G. DISCUSSION OF RESULTS

The production runs yielded nearly 1,000 tonnes of magnetite, having an average grade of 83% Fe3O4, from 2,000 ore tonnes. Product grades were initially below specifications for heavy media usage. However, final product grades (S.G. 4.7) were comparable to competing magnetite sources. The product was relatively coarse due to limitations on the grinding and classification circuit.

Ideally, the pilot plant would have employed two-stage grinding and larger magnetic separators. Time considerations caused the tests to be conducted using inadequate equipment. Innovation and invention were utilized to overcome equipment limitations., as outlined below:

1. A magnetic separator was installed in the grinding circuit to reject waste from the classifier oversize. This system worked will except that pyrite build-up plugged the separator. This approach could work with properly designed separators and is likely to be utilized in plant design,
2. The final concentrate was deslimed by overflowing the final product thickener. Waste fines overflowed readily while magnetite which flocculates naturally settled rapidly and was not lost. This system worked well and will be incorporated in plant design, though proper

deslimers will be used rather than thickners.

3. A dry cobbing system was installed over the conveyor from the primary crusher. This system worked very well even though the cobber, a tramp iron magnet, and the conveyor were not designed properly for this purpose. Also, the ore was too coarse on that belt for optimum separation of ore and waste. Still, dramatic grade improvements occurred with modest, and reducable, product loss. This system will be added to plant design.

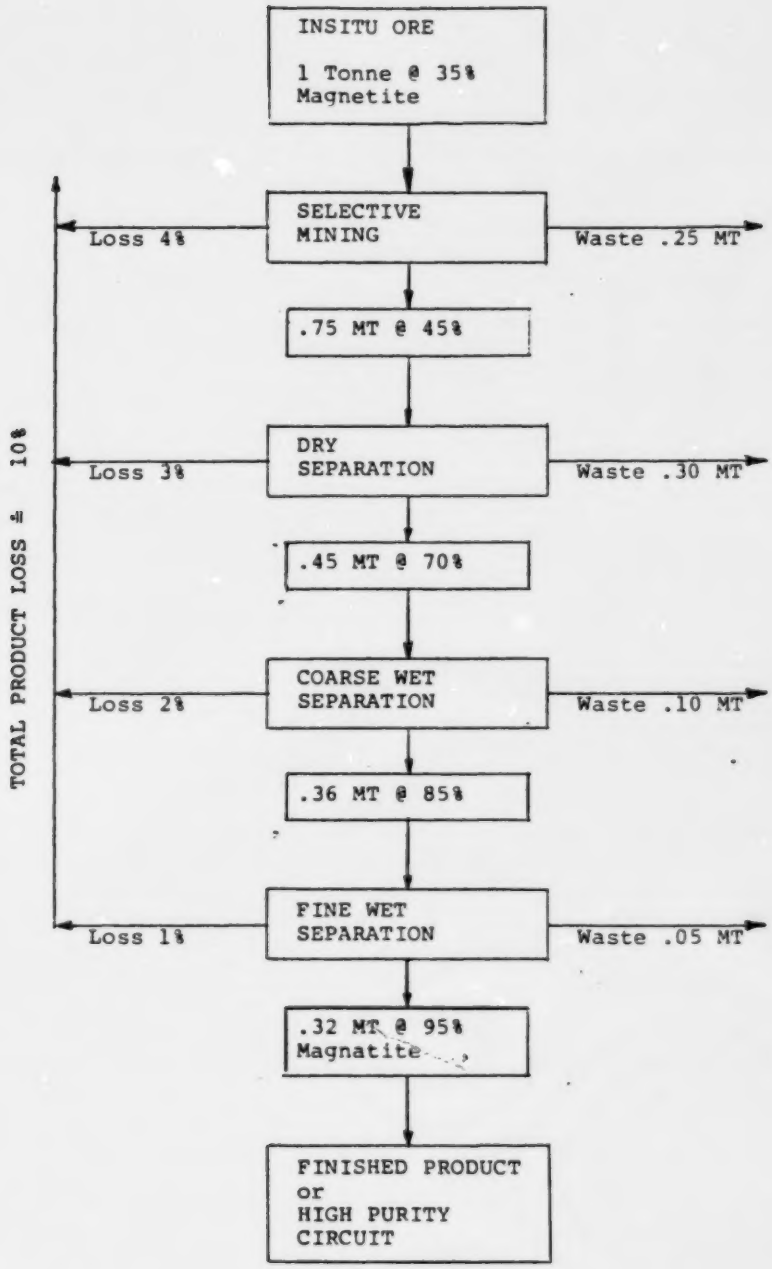
These innovations would not have been necessary if proper equipment could have been used. However, the benefits identified from these innovations are some of the more important results of the study.

In spite of equipment limitations, the test program established that the Bass River Magnetite ore can be processed to heavy media specifications. Some sacrifice of recovery will be necessary to achieve these specifications. However, overall recoveries should exceed 90% so that some losses can be tolerated.

The system utilized was inadequate for use on a production system as costs were relatively high in addition to producing marginal grades and particle size. The high costs resulted from the ore having a high work index which reduced ball mill capacity

and caused excessive grinding media consumption. The high work index is largely caused by high silica content. Silcia also inhibited the performance of the classification system due to the large difference in specific gravity between magnetite and silcia which reduces cyclone classification efficiency. Excess silcia was identified as a major factor effecting the potential of the project.

The performance of the grinding system, in terms of product quality and operating costs, can be enhanced substantially by reducing silica content prior to grinding to final product specifications. Silica reduction can be accomplished by removing low grade ore from production system as per the following schematic diagram.


INSITU ORE
1 Tonne @ 35%
Magnetite
SELECTIVE MINING
Loss 4%
Waste .25 MT
.75 MT @ 45%
DRY SEPARATION
Loss 3%
Waste .30 MT
.45 MT @ 70%
COARSE WET SEPARATION
Loss 2%
Waste .10 MT
.36 MT @ 85%
FINE WET SEPARATION
Loss 1%
Waste .05 MT
.32 MT @ 95%
Magnatite
FINISHED PRODUCT
or
HIGH PURITY
CIRCUIT
TOTAL PRODUCT LOSS = 10%

The recovery rates and product grades, as outlined above, are estimates based on bench tests, pilot plant results and deposit and ore characteristics. With the exception of selective mining, where additional information is needed, these estimates are considered to be accurate within a tolerance of +/- 10%. Note that recovery rates for milling operations are not the sole basis of the estimates as the optimal circuit arrangements could not be achieved and there were too many shrinkage points in the existing circuits for meaningful grade/recovery balances to be determined.

H. CONCLUSION

The benefication tests demonstrated that the ore can be processed to heavy media specifications. Modifications should be made to the flowsheet to incorporate dry cobbing of the ore, two stage grinding, and magnetite separation and desliming. Overall recoveries in excess of 90% can be expected where grades of 92% Fe304 are achieved. Benefication is technically and economically viable at prevailing prices for magnetite as heavy media.

IV

PRODUCT TESTING

A. INTRODUCTION

The benificiation test generated about 1,000 tonnes of magnetite. This material was shipped to the Cape Breton Development Corporation (DEVCO) for use as heavy media in the Victoria Junction Coal Preparation Plant. The preparation plant operated for three months using only Bass River magnetite as heavy media. The product was slightly below stated specifications. However, the magnetite still performed wel as heavy media with the minor operational problems. The following sections summarize results.

B. PRODUCT SPECIFICATION

The specifications for magnetite as heavy media vary somewhat depending on types of coal and operating procedures in each preparation plant. DEVCO requested the following specification:

Nominal Mesh Size	80-85% minus 325 100 minus 100 mesh
Specific Gravity	4.8 min.
Iron (Fe)	66.0 min.
TiO2	0.5 max.
Moisture	10.0 max.
% Magnetics at 325 mesh	92.0 % min.

The current supplier does not meet these speicification but the product performs well and is, therefore, accepted.

C. MAGNETITE HANDLING SYSTEMS

The handling systems for magnetite at the Victoria Junciton are as follows:

1. Magnetite, as per the nominal specifications, is received from the supplier in rail car lots.
2. The product is dumped and transported by front-end loader to a quanset storage shed.
3. Magnetite is added to the system as needed for makeup purpose using a front-end load which dumps into a hopper where the product is slurried and pumped into surge tanks.
4. The surge tanks feed several batch-type ball mills which grind the magnetite to a mean particle size of 12 - 15 microns.
5. The ground magnetite is metered into the heavy media circuits to maintain fluid density.

D. LODESTONE - MAGNETITE PERFORMANCE

Lodestone's magnetite was used instead of that from the regular supplier for a three month period, consuming about 1,000 tonnes of product. This was initially well below the normal specifications as previously described having the following characterics.

Mesh Size	70-75% minus 325 mesh 100% minus 100 mesh
Specific Gravity	4.4 - 4.5
Iron	61%
TiO2	0.05%
Moisture	10%
Magnetics @325	95%

In spite of the variance with standard grades, the Lodestone material performed extremely well having comparable characteristics with premium magnetite in terms of performance and recovery. However, more intense regrinding was necessary and losses occurred during re-grinding as silica was liberated.

These problems were virtually eliminated after modifications were made to the benefication pilot plant which enabled Lodestone to meet DEVCO's specifications.

E. CONCLUSION

The Bass River Magnetite is well suited for use as heavy media in terms of performance and recovery characteristics.

DEVCO did not encounter any difficulty in using the material even though the product only marginally met the nominal specification. With careful control of benefication parameters, a superior product could probably be produced.